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- 1 [Predictive state representations: a new theory for modeling dynamical systems](#)  
 Satinder Singh, Michael R. James, Matthew R. Rudary  
 July 2004 **Proceedings of the 20th conference on Uncertainty in artificial intelligence AUAI '04**

Publisher: AUAI Press

 Full text available: pdf(407.04 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

Modeling dynamical systems, both for control purposes and to make predictions about their behavior, is ubiquitous in science and engineering. Predictive state representations (PSRs) are a recently introduced class of models for discrete-time dynamical systems. The key idea behind PSRs and the closely related OOMs (Jaeger's observable operator models) is to represent the state of the system as a set of predictions of observable outcomes of experiments one can do in the system. This makes PSRs ...



- 2 [Composite sequence compaction for finite-state machines using block entropy and high-order Markov models](#)  
 Radu Marculescu, Diana Marculescu, Massoud Pedram  
 August 1997 **Proceedings of the 1997 international symposium on Low power electronics and design**

Publisher: ACM Press

 Full text available: pdf(892.59 KB) Additional Information: [full citation](#), [references](#), [citations](#)

- 3 [Online Only: ACM Transactions on Design Automation of Electronic Systems, vol. 11, issue 3 \(Novel Paradigms in System-Level Design\): A stimulus-free graphical probabilistic switching model for sequential circuits using dynamic bayesian networks](#)  
 Sanjukta Bhanja, Karthikeyan Lingasubramanian, N. Ranganathan  
 June 2004 **ACM Transactions on Design Automation of Electronic Systems (TODAES), Proceedings of the 41st annual conference on Design automation DAC '04**, Volume 11 Issue 3

Publisher: ACM Press

 Full text available: pdf(331.63 KB) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

We propose a novel, nonsimulative probabilistic model for switching activity in sequential circuits, capturing both spatio-temporal correlations at internal nodes and higher order-temporal correlations due to feedback. This model, which we refer to as the temporal dependency model (TDM), can be constructed from the logic structure and is shown to be

a dynamic Bayesian network. Dynamic Bayesian networks are extremely powerful in modeling high order temporal, as well as spatial, correlations; TDM ...

**Keywords:** Dynamic Bayesian networks, TDM, sequential circuits

4 Computation, communication, belief revision: Planning and programming with first-order markov decision processes: insights and challenges

Craig Boutilier

July 2001 **Proceedings of the 8th conference on Theoretical aspects of rationality and knowledge**

**Publisher:** Morgan Kaufmann Publishers Inc.

Full text available:  [pdf\(978.99 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

Markov decision processes (MDPs) have become the de facto standard model for decision-theoretic planning problems. However, classic dynamic programming algorithms for MDPs [22] require explicit state and action enumeration. For example, the classical representation of a value function is a table or vector associating a value with each system state; such value functions are produced by iterating over the state space. Since state spaces grow exponentially with the number of domain features, the ...

5 Visualization of navigation patterns on a Web site using model-based clustering

 Igor Cadez, David Heckerman, Christopher Meek, Padhraic Smyth, Steven White

August 2000 **Proceedings of the sixth ACM SIGKDD international conference on Knowledge discovery and data mining**

**Publisher:** ACM Press

Full text available:  [pdf\(284.94 KB\)](#) Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

**Keywords:** Internet, Web, data visualization, model-based clustering, sequence clustering

6 Modeling multipath fading channel dynamics for packet data performance analysis

Young Yong Kim, San-qi Li


December 2000 **Wireless Networks**, Volume 6 Issue 6

**Publisher:** Kluwer Academic Publishers

Full text available:  [pdf\(268.51 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [index terms](#)

The multipath fading channel modeling traditionally focuses on physical level dynamics such as signal strength and bit error rate. In this paper we characterize multipath fading channel dynamics at the packet level and analyze the corresponding data queueing performance in various environments. The integration of wireless channel modeling and data queueing analysis provides us a unique way to capture important channel statistics with respect to various wireless network factors such as chann ...

7 Dynamic conditional random fields: factorized probabilistic models for labeling and segmenting sequence data

 Charles Sutton, Khashayar Rohanimanesh, Andrew McCallum

July 2004 **Proceedings of the twenty-first international conference on Machine learning ICML '04**

**Publisher:** ACM Press

Full text available:  [pdf\(169.61 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#)

In sequence modeling, we often wish to represent complex interaction between labels, such as when performing multiple, cascaded labeling tasks on the same sequence, or

when long-range dependencies exist. We present *dynamic conditional random fields (DCRFs)*, a generalization of linear-chain conditional random fields (CRFs) in which each time slice contains a set of state variables and edges---a distributed state representation as in dynamic Bayesian networks (DBNs)---and parameters are tie ...

### 8 Sequence compaction for probabilistic analysis of finite-state machines



Diana Marculescu, Radu Marculescu, Massoud Pedram

June 1997 **Proceedings of the 34th annual conference on Design automation DAC '97**

**Publisher:** ACM Press

Full text available: [pdf\(51.57 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)



[Publisher Site](#)

The objective of this paper is to provide an effective technique for accurate modeling of the external input sequences that affect the behavior of Finite State Machines (FSMs). The proposed approach relies on adaptive modeling of binary input streams as Markov sources of fixed-order. The input model itself is derived through a one-pass traversal of the input sequence and can be used to generate an equivalent sequence, much shorter in length compared to the original sequence. The compacted sequence can be ...

### 9 Modeling for text compression



Timothy Bell, Ian H. Witten, John G. Cleary

December 1989 **ACM Computing Surveys (CSUR)**, Volume 21 Issue 4

**Publisher:** ACM Press

Full text available: [pdf\(3.54 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#), [review](#)

The best schemes for text compression use large models to help them predict which characters will come next. The actual next characters are coded with respect to the prediction, resulting in compression of information. Models are best formed adaptively, based on the text seen so far. This paper surveys successful strategies for adaptive modeling that are suitable for use in practical text compression systems. The strategies fall into three main classes: finite-context modeling, i ...

### 10 An integrated mobility and traffic model for resource allocation in wireless networks



Hisashi Kobayashi, Shun-Zheng Yu, Brian L. Mark

August 2000 **Proceedings of the 3rd ACM international workshop on Wireless mobile multimedia**

**Publisher:** ACM Press

Full text available: [pdf\(943.60 KB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In a wireless communications network, the movement of mobile users presents significant technical challenges to providing efficient access to the wired broadband network. In this paper, we construct a new analytical/numerical model that characterizes mobile user behavior and the resultant traffic patterns. The model is based on a semi-Markov process representation of mobile user behavior in a general state-space. Using a new algorithm for parameter estimation of a general Hidden Semi-Markov ...


**Keywords:** admission control, mobility, resource allocation, traffic modeling, wireless networks

### 11 Web search and navigation: Relational Markov models and their application to adaptive web navigation



Corin R. Anderson, Pedro Domingos, Daniel S. Weld

July 2002 **Proceedings of the eighth ACM SIGKDD international conference on**

**Knowledge discovery and data mining****Publisher:** ACM PressFull text available:  pdf(1.17 MB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

Relational Markov models (RMMs) are a generalization of Markov models where states can be of different types, with each type described by a different set of variables. The domain of each variable can be hierarchically structured, and shrinkage is carried out over the cross product of these hierarchies. RMMs make effective learning possible in domains with very large and heterogeneous state spaces, given only sparse data. We apply them to modeling the behavior of web site users, improving predict ...

**Keywords:** Markov models, Web mining, personalization, relational probabilistic models, shrinkage

**12** [Hierarchical sequence compaction for power estimation](#)

Radu Marculescu, Diana Marculescu, Massoud Pedram

June 1997 **Proceedings of the 34th annual conference on Design automation DAC '97****Publisher:** ACM PressFull text available:  pdf(103.29 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)[Publisher Site](#)

This paper presents an effective technique for compacting a large sequence of input vectors into a much smaller one such that when the two sequences are applied to any circuit, the resulting power dissipations are nearly the same. Specifically, this paper introduces the hierarchical modeling of Markov chains as a flexible framework for capturing not only complex spatiotemporal correlations, but also dynamic changes in the characteristics of the input sequence. The new framework has a high degree of adapt ...

**13** [Trace-driven steady-state probability estimation in FSMs with application to power estimation](#)

D. Marculescu, R. Marculescu, M. Pedram

February 1998 **Proceedings of the conference on Design, automation and test in Europe****Publisher:** IEEE Computer SocietyFull text available:  pdf(69.96 KB)Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)[Publisher Site](#)

This paper illustrates, analytically and quantitatively, the effect of high-order temporal correlations on steady-state and transition probabilities in finite state machines (FSMs). As the main theoretical contribution, we extend the previous work done on steady-state probability calculation in FSMs to account for complex spatiotemporal correlations which are present at the primary inputs when the target machine models real hardware and receives data from real applications. More precisely: 1) us ...

**Keywords:** Probabilistic FSM analysis, high-order Markov chains, power estimation

**14** [Risk analysis: derivatives pricing and risk-sensitive estimation: Risk and information in the estimation of hidden Markov models](#)

Vahid R. Ramezani, Steven I. Marcus, Michael Fu

December 2004 **Proceedings of the 36th conference on Winter simulation WSC '04****Publisher:** Winter Simulation ConferenceFull text available:  pdf(297.23 KB)Additional Information: [full citation](#), [abstract](#), [references](#)

In this paper, we consider the relationship between risk-sensitivity and information. Product estimators are introduced as a generalization of Maximum A Posteriori Probability (MAP) estimator for Hidden Markov Models. We study the relationship between the inclusion of higher order moments, the underlying dynamics and the availability of information. Asymptotic periodicity of these estimators and the relationship between risk and information is studied via simulation.

# 15 Recovery time of dynamic allocation processes



Artur Czumaj

June 1998 **Proceedings of the tenth annual ACM symposium on Parallel algorithms and architectures**

**Publisher:** ACM Press

Full text available: [pdf\(1.38 MB\)](#)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

# 16 An inter-reference gap model for temporal locality in program behavior



Vidyadhar Phalke, Bhaskarpillai Gopinath

May 1995 **ACM SIGMETRICS Performance Evaluation Review , Proceedings of the 1995 ACM SIGMETRICS joint international conference on Measurement and modeling of computer systems SIGMETRICS '95/PERFORMANCE '95,**

Volume 23 Issue 1

**Publisher:** ACM Press

Full text available: [pdf\(1.16 MB\)](#)

Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

The property of locality in program behavior has been studied and modelled extensively because of its application to memory design, code optimization, multiprogramming etc. We propose a  $k$  order Markov chain based scheme to model the sequence of time intervals between successive references to the same address in memory during program execution. Each unique address in a program is modelled separately. To validate our model, which we call the Inter-Reference Gap (IRG) model, we show substant ...

**Keywords:** Markov chains, dynamic memory management, locality of reference, memory replacement, prediction, trace compaction, trace driven simulation

# 17 An analysis of the information content of address reference streams



Jeffrey C. Becker, Arvin Park, Matthew Farrens

September 1991 **Proceedings of the 24th annual international symposium on Microarchitecture**

**Publisher:** ACM Press

Full text available: [pdf\(618.07 KB\)](#)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

# 18 Coordinating mobile robot group behavior using a model of interaction dynamics



Dani Goldberg, Maja J. Mataric

April 1999 **Proceedings of the third annual conference on Autonomous Agents**

**Publisher:** ACM Press

Full text available: [pdf\(1.00 MB\)](#)

Additional Information: [full citation](#), [references](#), [citations](#), [index terms](#)

# 19 Modeling methodology B: modeling call centers: Approximate dynamic programming in multi-skill call centers



Ger Koole, Auke Pot

December 2005 **Proceedings of the 37th conference on Winter simulation WSC '05**

**Publisher:** Winter Simulation Conference

Full text available:  [pdf\(166.46 KB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#)

We consider a multi-skill call center consisting of specialists and fully cross-trained agents. All traffic is inbound and there is a waiting queue for each skill type. Our objective is to obtain good call routing policies. In this paper we use the so-called policy iteration (PI) method. It is applied in the context of approximate dynamic programming (ADP). The standard PI method requires the exact value function, which is well known from dynamic programming. We remark that standard methods to o ...

**20** [Throughput of selective-repeat ARQ with time diversity in Markov channels with unreliable feedback](#)

Michele Zorzi, Ramesh R. Rao

March 1996 **Wireless Networks**, Volume 2 Issue 1

**Publisher:** Kluwer Academic Publishers

Full text available:  [pdf\(1.16 MB\)](#) Additional Information: [full citation](#), [abstract](#), [references](#), [citations](#), [index terms](#)

In this paper, a modified form of the ARQ selective repeat protocol with timer control is studied. Transmissions on both the forward and the reverse channels are assumed to experience Markovian errors and therefore the feedback is unreliable. Feedback error recovery is made possible through the use of time diversity. Using results from renewal theory, exact results for the throughput of the protocol are evaluated. In order to overcome the complexity of the exact analytical technique, lower a ...

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IEEE JNL IEE Journal or Magazine

IEEE CNF IEEE Conference Proceeding

IEEE CNF IEE Conference Proceeding

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 Volume 18, Issue 7, July 1999 Page(s):973 - 993  
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